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TAXONOMIC NOTES ON *ERIGERON* (ASTERACEAE: ASTEREAE) OF CALIFORNIA, NEVADA, AND ARIZONA

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ABSTRACT

In connection with taxonomic treatments of *Erigeron* from California, Nevada, and Arizona (submitted or in press), details are provided regarding some of the taxonomic decisions, most significantly those involving *E. lobatus* and *E. divergens*, *E. peregrinus*, the *E. eatonii* complex, *E. aphanactis*, and the taxa centered around *E. chrysopsidis*. Three new combinations are proposed (**E. eatonii** var. **nevadincola**; **E. eatonii** var. **sonnei**; **E. chrysopsidis** var. **austiniae**) and comments are provided regarding possible sectional realignments of species centered around *E. linearis*. New distribution records are reported for *E. lobatus* (first records for Nevada and California) and *E. pumilus* (first records for New Mexico).

KEY WORDS: *Erigeron*, Asteraceae, Astereae, California, Nevada, Arizona, New Mexico

Before the publication of relatively condensed taxonomic treatments of *Erigeron* L. for the states of California (51 species, 71 taxa in total, submitted for the developing Jepson's Manual), Arizona (submitted for the developing Flora of Arizona, 36 species, 38 taxa in total), and Nevada (33 species, 38 taxa in total, Phytologia–this issue), several associated taxonomic and nomenclatural problems need to be addressed in greater detail.

In addition, species described since Cronquist's revision of the North American species (1947) are now known from Arizona (Nesom & Roth 1981; Nesom 1989b, 1990c, 1990d) and California (Nesom 1992), concepts of Arizona taxa have been modified (Nesom 1989a), and a species previously known only from México has been recorded for the state (Nesom & Baker 1991). I am treating the North American species of *Erigeron* sect. *Trimorpha* (Cass.) DC. as the genus *Trimorpha* Cass. (Nesom 1989c). Some species variably treated in the past as *Erigeron* or *Conyza* I recognize as *Conyza* (Nesom 1990a), while others I treat as the genus *Laennecia* Cass. (Nesom 1990b). *Erigeron ortegae* S.F. Blake (*Aster spinosus* Benth.) has been segregated as the genus *Chloracantha*, with a single species (Nesom *et al.* 1991; Sundberg 1991). A synopsis of the infrageneric taxonomy of *Erigeron* in North America is available (Nesom 1989d).

1. The *Erigeron foliosus* Nutt. group.

In his monograph of the North American species of *Erigeron*, Cronquist (1947) recognized six species and a total of eighteen taxa, including varieties, among the representatives of the *E. foliosus* group in the western United States. A recent treatment of this same group (Nesom 1992) recognizes fourteen species and a total of 28 taxa, including varieties. Of these, *E. oxyphyllus* E. Greene occurs only in Arizona and adjacent México; most of the rest of the taxa are centered in California.

2. *Erigeron algidus* Jeps.

The name *Erigeron petiolaris* E. Greene (Leafl. Bot. Observ. Crit. 2:205. 1912.) generally has been used for the monocephalous, high elevation species of California and Nevada, which is closely related to *E. simplex* E. Greene of the cordillera of the Southern Rocky Mountains. Greene's *E. petiolaris*, however, is a later homonym of *E. petiolaris* Vierh. (1906), a species of Siberia. The earliest available name for the North American species is *E. algidus* Jepson (*Man. Fl. Calif.* 1052. 1925.). *Erigeron simplex* was reported by Cronquist (1947) to occur in Nevada, but he cited no specimens from that state; Spongberg (1971) located no collections of *E. simplex* from Nevada. *Erigeron algidus* and *E. simplex* might be treated as varieties of a single species, but because of their morphological distinction and wide disjunction, they may be justifiably kept apart.

3. *Erigeron compositus* Pursh.

Several varieties have commonly been recognized within this species, based on leaf morphology (most commonly var. *compositus*, var. *discoideus* A. Gray, and var. *glabratus* Macoun; for others, see Cronquist 1945). Recent studies of cytogeography and molecular variation within *Erigeron compositus* (Beaman unpublished; Noyes *et al.* 1987; Noyes 1988) provide evidence that these traditional infraspecific categories are artificial and replace them with a detailed and presumably more natural system of classification. Until the publication of Beaman's formal system of nomenclature for these variants, I am treating the species without any formally recognized infraspecific elements.

4. *Erigeron lobatus* A. Nelson and *E. divergens* Torr. & Gray.

Erigeron lobatus is a distinctive species closely related to the Arizona endemic *E. piscaticus* Nesom and the widespread, primarily Mexican species *E. velutipes* Hook. & Arn. (Nesom 1989b). Some plants of *E. lobatus*, appear to be influenced by genes of *E. divergens*, but the two species for the most part maintain their own identity when occurring in close proximity. They are distinguished by the following contrasts.

a. Stems and phyllaries minutely but densely and prominently stipitate glandular and very sparsely hairy with eglandular, straight, spreading hairs 0.5-2.0 mm long; basal and lower cauline leaves with deep lobes with rounded apices; phyllaries ovate-lanceolate, the margins thin hyaline; flowering December-May(-June, -September), in habitats at 1200-3800 ft (in Arizona). .... *E. lobatus*

a. Stems and phyllaries densely and evenly pubescent with eglandular, spreading, often slightly crinkly hairs 0.1-1.0 mm long, sometimes also minutely granular glandular but the glandularity not prominent; basal and lower cauline leaves entire, or if lobed the lobes shallow to deep with acute apices; phyllaries lanceolate, the margins relatively thick; flowering (February-)April-October, in habitats at 3500-8050 ft (in Arizona). .... *E. divergens*

Erigeron lobatus is restricted to eastern Arizona and adjacent Sonora, México, except for one collection from Nevada and one from California, each the first report of the species from its respective state, and both very near the Arizona border. (1) Nevada, Clark Co., Valley of Fire, 11 Apr 1937, *Maguire 1-7874* (UT). This plant is slightly different from typical *E. lobatus* in its vestiture, mostly lacking conspicuous stipitate glands and producing a denser portion of eglandular hairs. In overall morphology, it is similar to *E. lobatus*, but it is perhaps genetically influenced by *E. divergens* and approaches the "accedens form" of *E. divergens* (see below). (2) California, San Bernardino Co., vicinity of Stepladder Mountains and Ward Valley, 20 mi E of Essex, 1800 ft, 14 May 1978, *Faulkner 608* (TEX,UCR). This collection is of typical *E. lobatus*.

A form of *Erigeron divergens* with persistent, deeply pinnatifid basal leaves with long petioles, elongated lower internodes, and a strong tendency toward perenniality has been described both as *E. accedens* E. Greene and *E. californicus* Jepson (see citations below). The form is particularly distinctive in California, where *E. divergens* otherwise produces basal leaves that are mostly entire. I have annotated a number of specimens of the atypical form as the "accedens form" of *E. divergens*, although Jepson's name predates Greene's.

Such plants are commonly identified as *E. lobatus*, and they may be of hybrid origin between *E. divergens* and *E. lobatus*, but they are more similar in vestiture to *E. divergens*. They are found not only in the area where both putative parental species occur (primarily Arizona, where the "accedens form" is more abundant than elsewhere) but outside of it as well (central and southern California to Arizona, and much less commonly in New Mexico, trans-Pecos Texas, northern Sonora, and Chihuahua), and it seems likely that such plants have had a single origin. The plants of the "accedens form" for which chromosome counts are available all are triploid (and probably agamospermic) (from Arizona: Keil & Pinkava 1976; Pinkava & Keil 1977; Solbrig *et al.* 1969; from Texas and New Mexico, Turner & Zhao in prep.), although other more typical forms of *E. divergens* have also been reported as triploid. The "accedens form" is broadly sympatric with more typical *E. divergens* and is one of several morphotypes in the *E. divergens* complex that probably deserve formal taxonomic recognition at some rank.

Erigeron accedens E. Greene, Pittonia 4:155. 1900. TYPE: UNITED STATES. Arizona: Greenlee Co., Clifton, Apr 1899, *Dr. A. Davidson s.n.* (HOLOTYPE: ND-G!).

Erigeron californicus Jepson, Bull. Torr. Bot. Club 18:324. 1891. TYPE: UNITED STATES. California: Sutter Co., Marysville Buttes, [edge of the] summit of South Peak, 20 Apr 1891, *W.L. Jepson s.n.* (HOLOTYPE: JEPS!; Isotype: JEPS!).

5. *Erigeron multiceps* E. Greene.

The plants of the type collection (see below) are distinctively perennial, with thick, branching caudices, and the stem pubescence is upwardly ascending-appressed. Otherwise, in both floral and vegetative features, as noted by Cronquist (1947), the plants of *Erigeron multiceps* are very similar to the most common form of *E. divergens* in California. A number of collections of relatively typical *E. divergens* have been made in the immediate area of the type locality of *E. multiceps*, and if the latter is indeed distinct from *E. divergens*, it seems that it must be a rare species.

Plants of *Erigeron divergens* with appressed stem pubescence, though uncommon, have been collected from the southern part of its range (*e.g.*, Esmeralda and Clark cos., Nevada; Cochise Co., Arizona). Similar variation occurs in other species of *Erigeron*, and a rarely occurring shift in the orientation of stem vestiture provides weak justification for segregating taxa, particularly as *E. divergens* is variable in other features as well. Field work is needed to clarify the identity of *E. multiceps* and its relationship to *E. divergens*, but until such is available, I have maintained the former as a separate species.

Erigeron multiceps E. Greene. Pittonia 2:167. 1891. TYPE: UNITED STATES. California: [Kern Co.], gravelly spots near river banks, N. Fork of the Kern River, 7-15 Jun 1888, *E. Palmer* [and Wright] *121* (LECTOTYPE [designated here]: ND-G!; Isolectotypes: NY!,US!,US photo-CAS!).

6. *Erigeron peregrinus* (Banks *ex* Pursh) E. Greene.

Cronquist (1947) regarded *Erigeron peregrinus* subsp. *callianthemus* (E. Greene) Cronq. as the southern segment of a widely distributed and variable species of western North America, with the typical subspecies occurring from the Aleutian Islands through Alaska and western Canada into Washington of the United States. Within subsp. *callianthemus*, var. *hirsutus* Cronq. of west central California and immediately adjacent Nevada appears to be weakly but justifiably maintained as a variety, but var. *scaposus* (Torr. & Gray) Cronq. and var. *angustifolius* (A. Gray) Cronq. can be recognized apart from the typical variety (var. *callianthemus* [E. Greene] Cronq.) only as arbitrarily distinguished and intergrading populations. These may be ecotypically differentiated in some areas, but they do not appear to represent coherent taxa with geographic integrity. Cronquist (1947) noted that var. *scaposus* occurs "approximately over the range of the subspecies," usually in alpine habitats. He placed the range of var. *angustifolius* from California and adjacent Nevada to British Columbia, also completely sympatric with the typical plants, though sometimes occurring to lower altitudes. While it does appear that plants with narrowly lanceolate to oblanceolate leaves, usually with acute apices, are most common in the Pacific states, they do not form a well differentiated group of populations that can justifiably be given formal taxonomic status. A study of variation within the two subspecies (sensu Cronquist) of *E. peregrinus* is underway (Nesom in prep.).

7. The *Erigeron eatonii* A. Gray complex.

In their study of *Erigeron eatonii* and allied taxa, Strother & Ferlatte (1988, p. 77) noted that all of the taxa treated by them "variously intergrade morphologically and may constitute a single, polymorphic species." Such a radical treatment would not be necessary, although I believe that two of the species recognized by them are better subsumed as varieties of *E. eatonii*: *E. sonnei* E. Greene and *E. nevadincola* S.F. Blake. Two new combinations are required:

Erigeron eatonii A. Gray var. **sonnei** (E. Greene) Nesom, *comb. nov.* BASIONYM: *Erigeron sonnei* E. Greene, Pittonia 1:218. 1888. *Erigeron nevadensis* (sic) A. Gray var. *sonnei* (E. Greene) Smiley, Univ. Calif. Publ. Bot. 9:373. 1921. TYPE: UNITED STATES. California: Nevada and Placer counties. W slope Washoe Mts., 22 Jul 1888, *C.F. Sonne 2* (HOLOTYPE: ND-G!). See Strother & Ferlatte (1988) for comments on the typification.

Erigeron eatonii A. Gray var. **nevadincola** (S.F. Blake) Nesom, *comb. et stat. nov.* BASIONYM: *Erigeron nevadincola* S.F. Blake, nom. nov., Proc. Biol. Soc. Wash. 35:78. 1922. Based on: *Erigeron nevadensis* A. Gray, Proc. Amer. Acad. Arts 8:649. 1873, *non* Wedd. 1857. TYPE: UNITED STATES. Nevada: Storey Co., Cedar Hill and Mt. Davidson, near Virginia City, 1863-64, *H.G. Bloomer s.n.* (LECTOTYPE [Cronquist 1947]: GH!).

Cronquist also (pers. comm.) observed a close similarity between *Erigeron sonnei* and *E. eatonii* var. *plantagineus* (E. Greene) Cronq. In his 1947 study, he treated *E. sonnei* only as a synonym of var. *plantagineus*. In the key and comments of Strother & Ferlatte (1988), *E. sonnei* and var. *plantagineus* are separated essentially only by a greater, though overlapping, number of pappus bristles per achene in the former, and intermediates between the two occur at least in Sierra Co., California. With a number of specimens of both taxa at hand, var. *sonnei* can be seen as nearly intermediate in head size between typical var. *nevadincola* and var. *plantagineus*. My treatment of *E. nevadincola*, in turn, is based on its intergradation with *E. sonnei*.

Var. *nevadincola* is distinctive among the varieties of *Erigeron eatonii* in its large heads and corollas. *Erigeron sonnei* also is relatively large headed, compared to the rest of *E. eatonii*. An unpublished study of mine of the *E. nevadincola-E. sonnei* complex in Nevada (on file in the *E. eatonii* reprint folder at TEX) indicates that *E. sonnei* and *E. nevadincola* are morphologically intergrading and can be separated only arbitrarily, at least in the central part of Nevada. The characters studied were leaf length and width, head width, phyllary length, disc corolla length, style appendage length and shape, and pappus bristle number (my counts of pappus bristles include numerous plants of *E. sonnei* and *E. nevadincola* with up to 35 bristles per achene, in contrast to Strother & Ferlatte's maximum of "24+" bristles). Strother & Ferlatte (1988, p. 91) themselves observed that "These intergrading taxa [*E. sonnei* and *E. nevadincola*] are probably conspecific; we maintain them at specific rank for the present in order to preserve established nomenclature." In fact, *E. sonnei* has already been treated as a variety of *E. nevadincola*, but the combination is invalid, as it was based on an illegitimate later homonym, *E. nevadensis* A. Gray; further, if the two are considered conspecific and distinct from *E. eatonii*, the earliest correct name for the species is *E. sonnei* (1888) vs. *E. nevadincola* (1922).

On the east and north sides of the range of *Erigeron eatonii* var. *nevadincola*, closely related taxa are completely separated from it geographically

(Strother & Ferlatte 1988, Figs. 1 and 2), and there is no morphological intergradation between var. *nevadincola* and any of them. The connection of var. *nevadincola* with the rest of *E. eatonii* is only through *E. sonnei.*

Erigeron sonnei and var. *nevadincola* are more similar to each other than either is to var. *plantagineus.* Var. *nevadincola* and var. *plantagineus* are relatively clearly distinguished where they approach each other along the Nevada-California border, but Strother & Ferlatte (1988) noted the occurrence of "occasional plants" (unspecified) intermediate between them in Washoe Co., Nevada. They did not record the presence of var. *plantagineus* in Nevada, and my own observations are accordant with their Fig. 1, which shows var. *nevadincola* in California only in a small area of Sierra Co. and the adjacent southernmost portion of Lassen Co.

Cronquist (1947, 1955) and Munz (1959) both noted the occurrence of *Erigeron eatonii* var. *plantagineus* in Nevada, but the plants upon which these reports were based probably are those identified by Strother & Ferlatte as *E. sonnei.* Such observations, however, indicate the close similarity between var. *plantagineus* and *E. sonnei.* As treated here, the differences among the varieties of *E. eatonii* that occur in California and Nevada are strictly quantitative. Distinctions between other of the varieties involve size as well as variation in vestiture.

In treating other taxa of the *Erigeron eatonii* group, I have followed Strother & Ferlatte (1988) in considering *E. flexuosus* Cronq. merely a synonym of *E. lassenianus* E. Greene but note that the populations identified as the former apparently are completely disjunct from the range of typical *E. lassenianus.* As noted by Strother & Ferlatte, the disjuncts tend to produce a slightly different vestiture, and a more detailed study would be valuable in assessing whether they might deserve formal recognition at some rank.

8. *Erigeron concinnus* (Hook. & Arn.) Torr. & Gray.

This species was regarded by Cronquist (1947) as a subspecies of *Erigeron pumilus* Nutt. (as subsp. *concinnoides* Cronq., with two varieties). A recent study (Nesom 1983) concluded that *E. concinnus* does not intergrade with *E. pumilus*, and the two are better recognized as distinct species. Study of additional collections has corroborated this, and the published distribution map (Nesom 1983, Fig. 1) remains essentially correct. The primary modification is the extension of the range of *E. pumilus* (var. *pumilus*) into north central New Mexico (several collections from Rio Arriba Co. - NMC,TEX, and UNM), a state from which that species has not been previously reported (Martin & Hutchins 1980).

Several collections of *Erigeron pumilus* var. *intermedius* Cronq. from the vicinity of Carson City, Nevada, are of thick stemmed, monocephalous, large leaved plants with highly abortive pollen. Similar plants also occur in Washoe

Co., Nevada, and adjacent Lassen Co., California. A triploid chromosome count ($2n=27$ univalents, *Raven 18545*-TEX, Solbrig *et al.* 1969) is known for such a plant from adjacent Storey Co., Nevada. Other chromosome counts from *E. pumilus* var. *intermedius* have been diploid ($n=9$ bivalents; Taylor & Brockman 1966; Semple 1985; Chinnappa & Chmielewski 1987; *Sundberg 1468*-TEX, apparently unpublished).

9. *Erigeron aphanactis* (A. Gray) E. Greene.

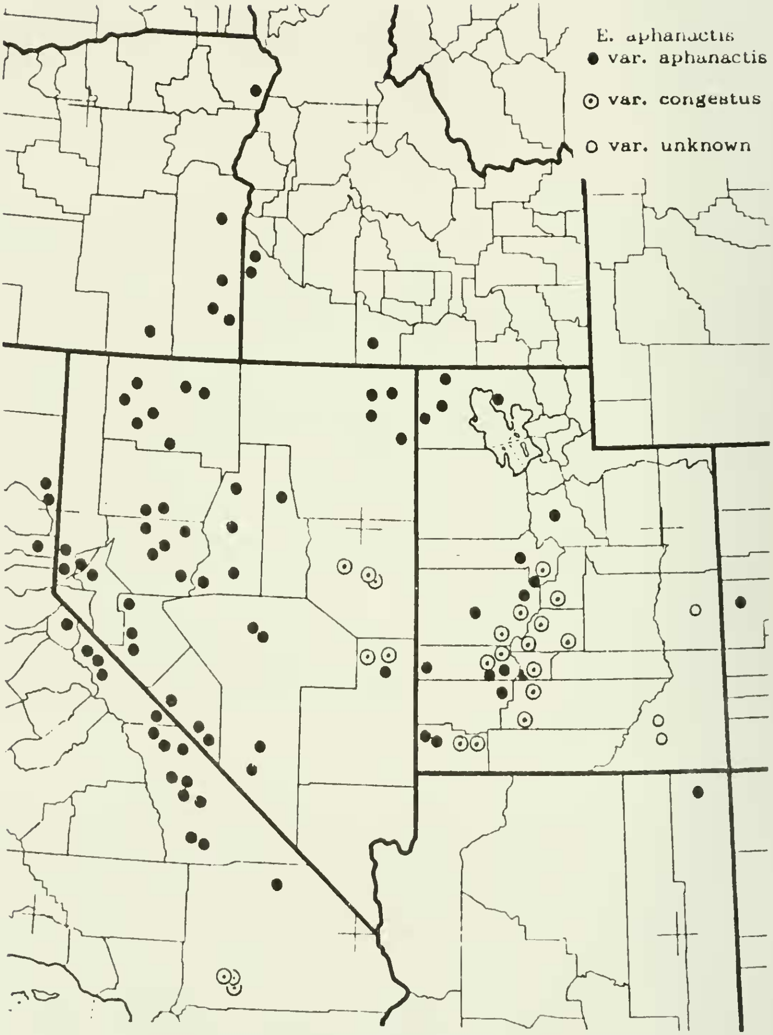
This species almost certainly is most closely related to those centered around *Erigeron pumilus* (Nesom 1989d, 1990d). This view is based in large part on the distinctive, reflexing ligules found in all of the taxa involved. The characteristically hairy disc corollas and the prominent, scaly, outer pappus of *E. aphanactis* are nearly identical to those found in the radiate *E. concinnus*. The geographic range and relative position of *E. concinnus* suggest, in contrast, that it is more closely related to *E. pumilus* (consisting of two varieties), all three taxa being derived from a widespread, evolutionarily fragmented, immediate ancestor (Nesom 1983, Fig. 1). *Erigeron concinnus* and *E. aphanactis* have broadly sympatric, nearly congruent ranges, and no unequivocal intermediates are known between *E. aphanactis* and any other species. The following nomenclatural paragraphs summarize my view, in agreement with Cronquist's, of the taxonomy of *E. aphanactis*:

Erigeron aphanactis (A. Gray) E. Greene, *Fl. Franc.* 4:389. 1897. *Erigeron concinnus* (Hook. & Arn.) Torr. & Gray var. *aphanactis* A. Gray, Proc. Amer. Acad. Arts 6:540. 1865. TYPE: UNITED STATES. Nevada: Carson City, 1864, *C.L. Anderson 205* (HOLOTYPE: GH!; Isotypes: MO!,NY!,US!).

Erigeron aphanactis (A. Gray) E. Greene var. *aphanactis*

Erigeron aphanactis (A. Gray) E. Greene var. *congestus* (E. Greene) Cronq., Brittonia 6:177. 1947. BASIONYM: *Erigeron congestus* E. Greene, Leafl. Bot. Observ. Crit. 2:218. 1912. TYPE: UNITED STATES. California: San Bernardino Co., Gold Hill, Bear Valley, 7000 ft, 2 Jun 1901, *S.B. Parish 4886* (HOLOTYPE: US!; Isotype: NY!).

The scapose, monocephalous plants of *Erigeron aphanactis* (var. *congestus*) occur primarily along the southeastern margin of the species (Map 1), although scattered, similar variants within populations may be found elsewhere. Similar variation in habit occurs within the closely related *E. concinnus*. *Erigeron pumilus* usually produces several heads per stem, and if it is assumed to be ancestral or phyletically coordinate with *E. aphanactis* and *E. concinnus*, the scapose habit is evolutionarily derived.



Map 1. Distribution of Erigeron aphanactis. Open symbols in southeastern Utah (Grand Co. and San Juan Co.) are added from Albee et al. (1988).

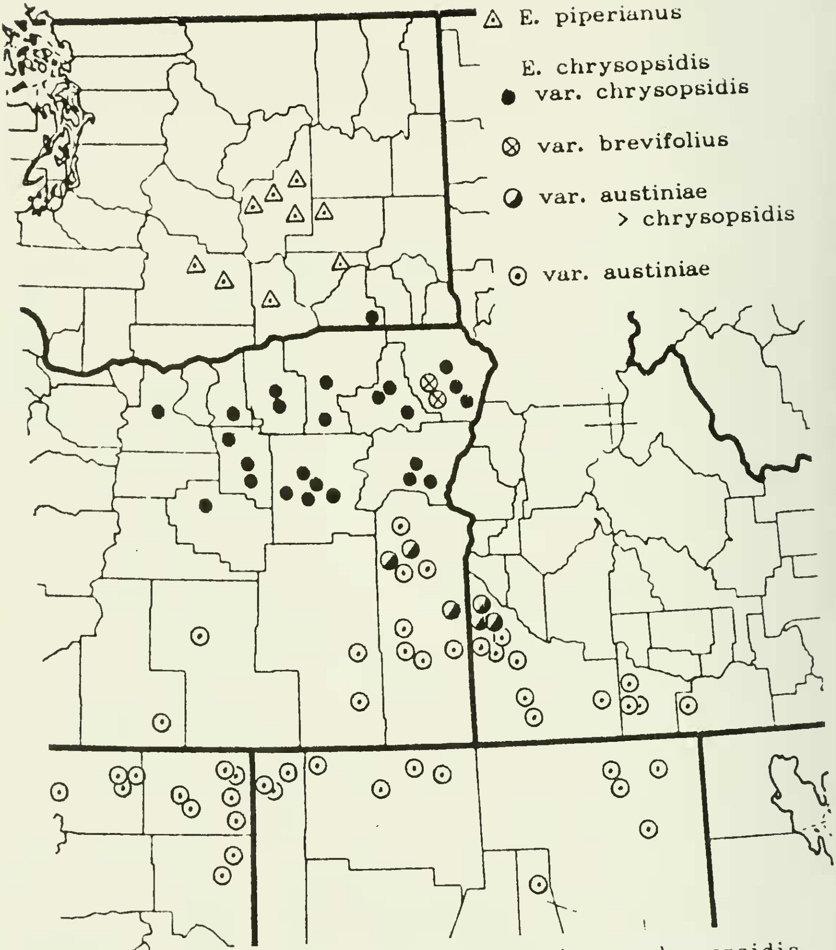
Erigeron concinnus is superficially very similar to *E. chrysopsidis* A. Gray var. *austiniae* (E. Greene) Nesom (see topic 10, below), particularly in the production of disciform heads, the pistillate flowers present but with extremely reduced ligules. This condition is not strictly homologous in these two species because *E. austiniae* E. Greene is apparently intimately related to a different group of species. Similar reduction of ligules also occurs in other, yet more distantly related, species of the genus.

10. The *Erigeron chrysopsidis* A. Gray complex.

My study of this complex is essentially in agreement with Cronquist's treatment of the same taxa, except for the provision of an additional taxonomic category for the southern segment of *Erigeron chrysopsidis*, which produces disciform heads. *Erigeron chrysopsidis* subsp. *chrysopsidis* (radiate) and subsp. *austiniae* (E. Greene) Cronq. (disciform) are allopatric and apparently closely related vicariads (Map 2). The latter might be maintained as a separate species, but in northwest Owyhee Co., Idaho, and in northern Malheur Co., Oregon, near the range of typical *E. chrysopsidis*, there are many plants, represented by numerous collections from different populations, with yellow, short ligules 1-3 (rarely 4) mm long. Elsewhere in the range of subsp. *austiniae* (E. Greene) Cronq., even the production of tiny ligules occurs only rarely. While these ligulate variants clearly belong with subsp. *austiniae* rather than with typical *E. chrysopsidis*, I cannot find any other character besides ligule length that would consistently distinguish them. Cronquist (1947) noted within one radiate population of *E. chrysopsidis* from Umatilla Co., Oregon, a rare tendency for the reduction of ligules parallel to that of subsp. *austiniae*. *Erigeron austiniae* is justifiably regarded as conspecific with *E. chrysopsidis*; I treat it as a variety in order to provide a category of coordinate rank with the other varieties of *E. chrysopsidis*. In the rest of the genus, "variety" is used as the primary taxonomic category to describe infraspecific variants.

Cronquist (1947) initially treated the plants of *Erigeron chrysopsidis* var. *brevifolius* Piper as a synonym of the typical element of *E. chrysopsidis*, but he later acknowledged their distinctive morphology and accepted their formal taxonomic recognition (1960; Hitchcock & Cronquist 1973). Although the differences of var. *brevifolius* from the typical variety are primarily quantitative, the former is easily distinguished and is restricted to the Wallowa Mountains of Wallowa Co., Oregon (Map 2), at high elevations (6100-10300 ft), whereas var. *chrysopsidis* occurs at 2800-4300(-6000) ft over its range. Intergrades exist but apparently are few, and more detailed study, including field observations, are needed for a more critical assessment of the nature of the relationship between the two taxa.

Keys that distinguish *Erigeron chrysopsidis* and *E. piperianus* (1947; Hitchcock & Cronquist 1973) have relied primarily on differences in stem vestiture



Map 2. Distribution of Erigeron chrysopsidis and E. piperianus.

and in size of heads and plants. With a greater range of specimens available for comparison, it can now be seen that these putative morphological differences between *E. chrysopsidis* var. *brevifolius* Piper and *E. piperianus* are considerably overlapping. Both are separated from typical *E. chrysopsidis* by a tendency for the stem hairs to be appressed and by a reduction in head and flower size. Compared to var. *brevifolius*, however, *E. piperianus* has leafier stems and the stem indument lacks the minute Type B trichomes and stipitate glands (Type C trichomes) commonly produced by *E. chrysopsidis*.

There are four yellow rayed species of North American *Erigeron*: *E. chrysopsidis*, *E. piperianus*, *E. linearis* (Hook.) Piper, and *E. aureus* E. Greene. If it is acknowledged that *E. chrysopsidis* and *E. piperianus* are sister species, there are three yellow rayed lineages, each apparently independently derived from white or blue rayed ancestors. *Erigeron linearis* may be closely related to *E. chrysopsidis* and *E. piperianus* (see notes below, topic 11), but they are not derived from an immediate common ancestor.

Following is a formal nomenclatural summary and key to *Erigeron piperianus* and the varieties of *E. chrysopsidis*.

Erigeron piperianus Cronq., Brittonia 6:197. 1947. TYPE: UNITED STATES. Washington: Grant Co., sagebrush slopes N of Soap Lake in Grand Coulee, 18 May 1935, *J.W. Thompson 11490* (HOLOTYPE: NY!; Isotypes: GH!,LL!,MO!,RM!,TEX!,US!).

Erigeron chrysopsidis A. Gray

Chrysopsis hirtella DC., *Prodr.* 5:327. 1836. TYPE: UNITED STATES. [probably Oregon]: Columbia River, [ca. 1826,] *D. Douglas s.n.* (deCandolle cited only the Douglas collection, "v.s. comm. ab hon. soc. hortic. Lond.;" photo DS!, photo and fragment UC, *fide* Cronquist 1947). *Erigeron ochroleucus* Nutt. var. *hirtellus* (DC.) A. Gray, Proc. Amer. Acad. Arts 16:90. 1880. *Erigeron chrysopsidis* A. Gray [nom. nov.], *Syn. Fl. N. Amer.* 1(2):210. 1884 (not *E. hirtellus* DC. 1836.). *Erigeron curvifolius* Piper [nom. nov.], Bull. Torrey Bot. Club 27:396. 1900. The proposal by Piper of a second nomen novum for deCandolle's species apparently reflected both a misunderstanding of the nomenclatural code and a misidentification of the species. The plants Piper associated with his concept of *E. chrysopsidis* were those later named by Cronquist (1947) as *E. piperianus*. The type of *E. chrysopsidis* is not mapped (Map 2) or precisely known, as Douglas apparently collected at many sites along the Columbia River, including areas where the species is known to occur.

Erigeron chrysopsidis A. Gray subsp. *chrysopsidis*

Erigeron chrysopsidis A. Gray subsp. *chrysopsidis* var. *chrysopsidis*

Erigeron chrysopsidis A. Gray subsp. *chrysopsidis* var. *brevifolius* Piper, Bull. Torrey Bot. Club 27:395. 1900. TYPE: UNITED STATES. Oregon: [Wallowa Co.,] subalpine ridge of the Wallowa Mts. near the [Wallowa] Lake, 29 Jul 1899, *W.C. Cusick 2270* (HOLOTYPE: WS; Isotypes: GH!,MO!,NY!).

Erigeron chrysopsidis A. Gray subsp. *austiniae* (E. Greene) Cronq., Brittonia 6:196. 1947. BASIONYM: *Erigeron austiniae* E. Greene (below)

Erigeron chrysopsidis A. Gray subsp. **austiniae** var. **austiniae** (E. Greene) Nesom, *comb. et stat. nov.* BASIONYM: *Erigeron austiniae* E. Greene, Erythea 3:100. 1895. TYPE: UNITED STATES. California: Modoc County, Davis Creek, May 1894, *Mrs. R.M. Austin s.n.* (LECTOTYPE [designated here]: ND-G!; Isolectotypes: NY!,PH,UC).

Key to the taxa of the *Erigeron chrysopsidis* group

a. Ligules of ray flowers completely absent or inconspicuous and not or barely exceeding the involucre; longest phyllaries 4.5-6.0 mm long; disc corollas 3.5-4.5 mm long; stem pubescence spreading. .... var. *austiniae*

a. Ligules of ray flowers well developed and conspicuously exceeding the involucre; phyllary and corolla length various; stem pubescence variable. ....(b)

b. Longest phyllaries 5.0-6.5(-7.5) mm long; disc corollas 3.0-4.5 mm long; ligules (6-)8-11 mm long; stem pubescence spreading. ....var. *chrysopsidis*

b. Longest phyllaries 3.5-5.5 mm long; disc corollas 2.5-4.5 mm long; ligules 4-7 mm long; stem pubescence appressed to ascending appressed or spreading, the hairs of even length or markedly uneven. ....(c)

c. Leafless portion of the stem 1/3-1/2 the total stem length; longest phyllaries 3.5-4.0 mm long; disc corollas 2.5-3.0 mm long; Columbia River plains at ca. 900-1300 feet elevation, southeastern Washington. *E. piperianus*

c. Leafless portion of the stem 3/4-7/8 the total stem length; longest phyllaries 4.0-5.5 mm long; disc corollas 2.5-3.5 mm long; rocky slopes and cliffs at 6000-10,300 feet, Wallowa Mountains of Wallowa Co., Oregon. . . . . .var. *brevifolius*

11. Composition of *Erigeron* sect. *Osteocaulis* Nesom.

As noted in the discussion below, this group may prove to be more inclusive than I have defined it previously, or, alternatively, it may be possible to discern a close relationship among several of the species groups I have delimited as sections. In the strict sense, sect. *Osteocaulis* should include only the three species with petioles strongly developed into white cartilaginous, narrowly cylindrical sheaths on the lower stems: *Erigeron linearis*, *E. elegantulus* E. Greene, and *E. barbellulatus* E. Greene. The rayless *E. bloomeri* A. Gray probably belongs here also, based on its similarity in habit and vestiture, although its petiole bases are abruptly broadened and not cylindrically sheathing. *Erigeron compactus* S.F. Blake, *E. consimilis* Cronq., and two other species have been provisionally placed in sect. *Wyomingia* (Nesom 1989; 1991) but probably are more closely related to *E. bloomeri* and the core of sect. *Osteocaulis*. The species of the "*E. corymbosus* Nutt. group" of sect. *Asteroidea* Nutt. (sensu Nesom 1989d) also may be closely related to these, as may the species of sect. *Spathifolium* Nesom. Most of these species produce a characteristic indument of very small, closely appressed hairs. The only remaining species of *Erigeron* with a similar vestiture, those of sect. *Wyomingia* (A. Nels.) Cronq., may also belong with this group; their branching stems and multinerved achenes are probably evolutionarily specialized, as also implied by Cronquist (1947).

The two other species originally placed in sect. *Osteocaulis* (Nesom 1989d), the yellow rayed *Erigeron chrysopsidis* and *E. piperianus*, have petiole bases abruptly expanded and white indurated but not sheathing like those of *E. linearis*. Plants similar to *E. chrysopsidis*, with similar petiole bases as well as glandular stems with spreading hairs and petioles with coarsely ciliate bases, are also found in the species of the "*E. radicatus* Hook. group" of sect. *Asteroidea* (Nesom 1989). *Erigeron chrysopsidis* may be more closely related to these latter taxa than to *E. linearis* and its closest relatives.

The placement of the "*Erigeron pumilus* group" within *Erigeron* remains problematic. Although the plants are very similar in habit to those of the "*E. radicatus* group," the sharply reflexing (vs. apically coiling) ligules of *E. pumilus* suggest the existence of a different lineage, and Nesom (1990d) has placed these species with a primarily Mexican group as part of sect. *Geniculactis* Nesom. In southeastern Utah, on rare plants of the essentially rayless *E. aphanactis*, short ligules are produced on the ray flowers, and these can be seen to reflex, marking the affinity of *E. aphanactis* with *E. pumilus* rather than the superficially similar *E. chrysopsidis* var. *austiniae*.

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